CLAIMS

What is claimed is:

1. A method of evaluating the dynamics of caloric restriction (CR) comprising:

obtaining control data from an administering of a long-term control (LT-CON) diet program;

subjecting each of several mammalian sample groups to a CR diet program wherein each of said several mammalian sample groups is subjected to said CR diet program for a different amount of time; and

comparing effects of said CR diet program between each of said several mammalian sample groups and said control data and comparing effects among members of said several mammalian sample groups.

2. The method as in claim 1 wherein said comparing effects further comprises utilizing a microarray analysis to analyze changes in each of said several mammalian sample groups that are caused by said CR diet program.

3. The method as in claim 1 wherein said comparing effects further comprises utilizing a microarray analysis to analyze changes in each of said several mammalian sample groups that are caused by said CR diet program and wherein said method further comprises validating said effects using real time RT-PCR (Reverse Transcriptase-Polymerase Chain Reaction).

4. The method as in claim 1 wherein said mammalian sample groups include one of rodents, humans, and monkeys.

5. The method as in claim 1 wherein said different amount of time varies from about a few weeks to about a few months.

6. The method as in claim 1 wherein said subjecting each of several mammalian sample groups to a CR diet program further comprises subjecting a first sample group to a CR diet program for a first predetermined period, subjecting a second sample group to said CR diet program for a second predetermined period, and subjecting a third sample group to said CR diet program for a third predetermined period, said first predetermined period being shorter than said second predetermined period and said second predetermined period being shorter than said third predetermined period.

7. The method as in claim 6 wherein said first predetermined period is about 2 weeks.

8. The method as in claim 6 wherein said second predetermined period is about 4 weeks.

9. The method as in claim 6 wherein said third predetermined period is about 8 weeks.

10. The method as in claim 1 wherein said comparing effects further comprises at least one of comparing said effects among said first sample group, said second sample group, and said third sample group to said control data and comparing said effects among said first sample group, said second sample group, and said third sample group to each other.

11. The method as in claim 1 wherein said effects including at least one of changes in gene expression levels, changes in protein levels, changes in protein activity levels, changes in carbohydrate or lipid levels, changes in nucleic acid levels, changes in rate of protein or nucleic acid synthesis, changes in protein or nucleic acid stability, changes in protein or nucleic acid accumulation levels, changes in protein or nucleic acid degradation rate, and changes in protein or nucleic acid structure or function.

12. The method as in claim 1 wherein said method further comprises fractionating genes into clusters based on how said genes are affected by said different amounts of time said CR diet program is subjected to each of said several mammalian sample groups.

13. The method as in claim 1 wherein said effects include changes in gene expression levels and wherein said method further comprises validating said changes in gene expression levels using real time RT-PCR.

14. The method as in claim 1 wherein said comparing said effects is to obtain said dynamics of CR.

15. A method of evaluating dynamics of CR comprising:

dividing a mammalian sample group into a first sample group and a second sample group;

subjecting said first sample group to a LT-CON diet program for a first predetermined period and said second sample group to a long-term caloric restriction (LT-CR) diet program for a second predetermined period;

after said first predetermined period, switching portions of said first sample group to a CR diet program for a third predetermined period;

after said second predetermined period, switching at least a portion of said second sample group to a control diet program for said third predetermined period and maintaining the other portion of said second sample group on said LT-CR diet program; and

comparing the effects of CR among members of said first sample group and said second sample group.

16. The method as in claim 15 wherein said comparing said effects is to obtain said dynamics of CR.

17. The method as in claim 15 wherein said switching portions of said first sample group to a CR diet program for different amounts of time further comprising:

switching a first portion of said first sample group to a CR diet program for a fourth predetermined period;

switching a second portion of said first sample group to said CR diet program for a fifth predetermined period;

switching a third portion of said first sample group to a CR diet program for a sixth predetermined period; and

maintaining a fourth portion of said first sample group on said LT-CON diet program.

18. The method as in claim 15 wherein said comparing effects further comprises utilizing a microarray analysis to analyze changes in each of said first sample group and said second sample group that are caused by said CR diet program at different amounts of time.

19. The method as in claim 15 wherein said comparing effects further comprises utilizing a microarray analysis to analyze changes in each of said several mammalian sample groups that are caused by said CR diet program and wherein said method further comprises validating said effects using real time RT-PCR.

20. The method as in claim 15 wherein said mammalian sample groups including one of rodents, humans, and monkeys.

21. The method as in claim 15 wherein said different amounts of time varies from a few weeks to a few months.

22. The method as in claim 15 wherein said first predetermined amount of time is 116 weeks.

23. The method as in claim 15 wherein said second predetermined amount of time is about 116 weeks.

24. The method as in claim 15 wherein said third predetermined amount of time is about 8 weeks.

25. The method as in claim 17 wherein said fourth predetermined amount of time is about 2 weeks.

26. The method as in claim 17 wherein said fifth predetermined amount of time is about 4 weeks.

27. The method as in claim 17 wherein said sixth predetermined amount of time is about 8 weeks.

28. The method as in claim 15 wherein said effects including at least one of changes in gene expression levels, changes in protein levels, changes in protein activity levels, changes in carbohydrate or lipid levels, changes in nucleic acid levels, changes in rate of protein or nucleic acid synthesis, changes in protein or nucleic acid stability, changes in protein or nucleic acid accumulation levels, changes in protein or nucleic acid degradation rate, and changes in protein or nucleic acid structure or function.

29. The method as in claim 15 wherein said method further comprises fractionating genes into clusters based on how said genes are affected by said different amounts of time said CR diet program and by said switching portions of said first sample group to a CR diet program for different amount of times and said switching at least a portion of said second sample group to a control diet program for a third predetermined period and maintaining the other portion of said second sample group on said LT-CR diet programs.

30. A method of reversing effects of CR comprising:

administering a control diet program to a mammalian sample group that has been subjected to a LT-CR diet program wherein said control diet program includes higher calorie allowance for said mammalian sample group than the calories for said LT-CR diet program.

31. The method as in claim 30 wherein said mammalian sample group is subjected to said LT-CR diet program for about 116 weeks and wherein said control diet program is administered to said mammalian sample group for about 8 weeks.

32. A method of extending longevity in an old mammal comprising:

administering a CR diet program to said old mammal.

33. The method as in claim 32 wherein said old mammal includes an old mouse.

34. The method as in claim 32 wherein said old mouse is about more than 18 months old.

35. The method as in claim 32 wherein old mammal is an old human of about more than 50 years old.

36. The method as in claim 32 wherein said administering comprises switching said old mammal to said CR diet program in at least one stage with a gradual decrease in the number of calories in diet programs.

37. A method of identifying an intervention for use in old age subjects comprising:

administering a control diet program to individuals in a first sample group;

administering, after a start of old age, at least one candidate intervention to said individuals in said first sample group; and

comparing effects of said candidate intervention to effects from a calorically restricted diet program on a second sample group.

38. The method as in claim 37 wherein said candidate intervention is, after said start of old age, administered concurrently with said control diet program.

39. The method as in claim 38 wherein said control diet program comprises a substantially normal number of calories.

40. The method as in claim 37 wherein said comparing effects comprises comparing at least one gene expression level in said individuals after said administering of said candidate intervention to at least one gene expression level from said second sample group.

41. The method as in claim 40 wherein said comparing effects comprises comparing a first plurality of gene expression levels, for a first plurality of genes, in said individuals after said administering of said candidate intervention to a second plurality of gene expression levels, for said first plurality of genes, from said second sample group and wherein said candidate intervention is identified as one deserving further screening if said first

plurality of gene expression levels substantially correlates to said second plurality of gene expression levels.

42. A method as in claim 41 wherein said first plurality of gene expression levels substantially correlates to said second plurality of gene expression levels when directions of changes in gene expression levels and magnitude of changes in gene expression levels substantially match.

43. A method as in claim 37 wherein said CR diet program on said second sample group is a long-term CR diet program.

44. A method as in claim 37 wherein said CR diet program on said second sample group is a short-term CR diet program.

45. A method as in claim 37 wherein said CR diet program on said second sample group is a CR diet program for said second sample group which begins after a start of old age for said second sample group.

46. A method as in claim 37 wherein said comparing effects comprises comparing at least one biochemical measurement from said individuals after said administering of said candidate intervention to at least one biochemical measurement from said second sample group.

47. A method as in claim 46 wherein said at least one biochemical measurement comprises one of (a) a nucleic acid measurement; (b) a protein measurement; (c) a lipid measurement; and (c) a carbohydrate measurement.

48. A method of identifying an intervention comprising:

exposing a biological sample to at least one intervention;

performing at least one biochemical measurement after exposing said biological sample to said intervention, said biochemical measurement being designed to show whether said intervention mimics at least some of the effects of CR (caloric restriction);

withdrawing said intervention from said biological sample; and

performing at least one further biochemical measurement after withdrawing said intervention, said at least one further biochemical measurement being designed to show whether said withdrawing mimics at least some of the effects of withdrawing CR.

49. A method as in claim 48 wherein said performing of said at least one further biochemical measurement is after at least about 1 week after said withdrawing.

50. A method as in claim 48 wherein said intervention is administered concurrently with a control diet program having a substantially normal amount of calories.

51. A method as in claim 48 wherein said performing at least one biochemical measurement comprises comparing at least one gene expression level of said biological sample to at least one gene expression level from a calorically restricted control sample.

52. A method as in claim 51 wherein said calorically restricted control sample is subjected to a long-term CR dietary program.

53. A method as in claim 51 wherein said calorically restricted control sample is subjected to a short-term CR dietary program.

54. A method as in claim 48 wherein said performing at least one biochemical measurement comprises comparing a first plurality of gene expression levels of said biological sample, for a first plurality of genes, to a second plurality of gene expression levels from a calorically restricted control sample.

55. A method as in claim 54 wherein said performing at least one biochemical measurement comprises comparing a third plurality of gene expression levels of said biological sample, for said first plurality of genes, to a fourth plurality of gene expression levels from a sample having been withdrawn from a CR diet.

56. A method as in claim 55 wherein said intervention is identified as one deserving further screening if said first plurality of gene expression levels substantially correlates to said second plurality of gene expression levels and said third plurality of gene expression levels substantially correlates to said fourth plurality of gene expression levels.

57. A method of verifying at least some caloric restriction (CR) effects comprising:

administering a LT-CR diet program to a mammalian sample group for a predetermined amount of time;

administering a short-term control (ST-CON) diet program to some individuals of said mammalian sample group for another predetermined amount of time; and

comparing effects of each of said ST-CON diet program and said LT-CR diet program to control data from an administering of a control diet program to a second mammalian sample group and to each other.